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MEMORANDUM

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Date MAR 24 1972

TO: [illegible] and M. H. Davies

12-26-30
RM-2553

Addressee's Copy

FROM: R. J. Lew and L. J. Henderson

SUBJECT: RECONNAISSANCE SATELLITE

COPIES: J. H. Huntzicker, E. C. Heffern, R. H. Frick, W. B. Graham, E. J. Barlow, R. L. Belzer, A. S. Mengel, J. W. Ellis, Jr., F. R. Collbohm

NRO Review Completed.

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This is just a short note to say that your recent reconnaissance satellite report is eliciting considerable interest here -- it would probably elicit more if we had morecopies, but that's another story. It tends to get confused with the GE proposal, but once the differences are pointed out, the RAND pitch looks so much the better that the confusion probably helps in this respect.

There are three areas in which up-to-date information is important, and we are highlighting these because we'd hate to see this one get away:

1) the BMD reaction-- from here, according to the Indians, despite what Putt says Schriever said, it looks as if BMD is going to maybe not move very fast on this opportunity or, anyway, pass it on to Lockheed, which is the same thing. Do you see anything coming from BMD which differs from this forecast? Are they really moving? What is the story on the ICBM version -- is BMD buying this?

2) the ARDC view-- We'll look to Jack Ellis to fill in this part, but was there any decisive outcome to your meeting there last Thursday?

3) HqUSAF-- while RJL has given Col. Andrews a copy of your tome, we still feel that you should stay loose anticipating a call to brief Gen. Tunner (and possibly the Recce Committee) in the reasonably near future.

If you do present a briefing here, we think it would be worthwhile to go over the ground you did in your recent D. We found your exposition of great value in placing the recent proposal and our long term interest in 117L in proper perspective. Since 117L has achieved what might be termed permanent program status and an enviable priority rating (No. 4 now), it will be necessary to discuss this point in some detail. For that matter, what is our view of 117L under the present circumstances? If there is any way of treating the cost question intelligently, this information should also be included. Possibly the two endpoints could be investigated; i.e., the case where the recce satellite is charged with the entire development cost including the vehicle, and the case where the final photographic stage gets a free ride (in the strict sense of the term) on the back-up ICBM development. If you have any up-to-date ideas on this subject, keep us informed -- after all, the mail does go both ways between Washington and Santa Monica.

R. J. Lew
R. J. Lew and L. J. Henderson, Jr.

GROUP 4
Downgraded at 3 year intervals;
Declassified after 12 years.

RJL:LJH:jta

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Army proposal - LBJ Library [FOIA release] Nov 1957

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BRIEFING ON ARMY SATELLITE PROGRAM

MR CHAIRMAN, Gentlemen:

The purpose of this presentation is to outline for you the Army's capability to contribute to a national program in the area of orbital space vehicles and their military applications.

The Soviet Union's second satellite success has materially increased the threat to our national security posed by SPUTNIK-I. Not only does it confirm Soviet intercontinental and shorter range ballistic missile claims, but the announced weight in excess of 1100 pounds, which has been confirmed by observations in this country, provides ample margin for an early capability for satellite reconnaissance of the United States.

As a result, we are today faced with urgent requirements in two primary areas. First, there are urgent immediate requirements for satellites to [illegible] reconnaissance, satisfy military and national requirements for [illegible] geodesy and mapping, communication, meteorological data on a world-wide [illegible], and as radar targets for counter-ICBM tracking and [illegible] equipment. Second, it is vitally important that the United [illegible] satellite at the earliest possible moment and then go on to [illegible] military successes in the field to offset the psychological [illegible] already impact of the Soviet's rapid advance which the Soviets have exploited and will continue to exploit in ever-increasing [illegible].

Beyond these immediate requirements we must realize that the achievement of these immediate objectives is but the first step in a military-scientific program that will stir man's imagination and widen his horizons. As we stand on the threshold of space travel we must truly visualize applications heretofore relegated to the "Buck Rogers" category. There must be no ceiling or limit to our ultimate objectives. We must contemplate as yet undreamed of scientific advances and the application of these advances to our military weapons systems, to commercial applications, and to our social system. Only in this way can we truly enhance our national military posture.

The program we will present today is one designed to meet these immediate requirements with the least possible delay and to serve as a logical first step in achieving a true "conquest of space." It is presented as a program to meet the nation's most pressing requirements at the earliest possible date by exploiting the capabilities of existing organizational teams which have demonstrated their ability to design, develop and fire ballistic missile systems successfully. Over 20 years of ballistic missile experience are available within Dr. von Braun's team at the Army Ballistic Missile Agency. Some 15 years of experience have been accumulated by Jet Propulsion Laboratory. These teams have studied [illegible] space vehicles as far back as 1946. [illegible] also in this [illegible] a comparable reservoir of proven experience and [illegible] is ready

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By [illegible] NLE Date 3/6/77

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to make these teams and any other of its resources available to assist in carrying forward this program of such great national importance.

The first requirement for the successful prosecution of a satellite program is for reliable carrier vehicles whose satellite payload capabilities are compatible with missions which appear timely and technically feasible for these payloads. Therefore, in planning this program, we first evaluated our launching capability on the basis of the fundamental considerations: the maximum use of available, flight-tested hardware, and non-interference with the JUPITER intermediate range ballistic missile program.

CHART 1 - Three Configurations

In accordance with the proven development philosophy of proceeding from the less to the more complex, the immediately available satellite launching capability will provide, in chronological order, orbital payloads of 20, 100, and 500 pounds, utilizing successively the configurations shown on this chart: the JUPITER-C on the left, the JUPITER missile with JUPITER-C upper stages in the center, and the JUPITER missile with improved, higher performance upper stages on the right. I should now like to describe each of these configurations in somewhat more detail.

The first 20-pound satellites will be launched with JUPITER-C missiles which were originally conceived and designed for this purpose beginning about October 1954. As shown by this model, these consist of an elongated REDSTONE booster and a cluster of solid propellant second, third, and fourth stages. This is a larger scale model of the solid propellant cluster which consists of reduced scale SERGEANT motors, repeatedly proven and flight-tested. The second stage consists of 11 reduced scale SERGEANT motors. The third stage consists of three reduced scale SERGEANT motors carried inside the second stage. The fourth stage consists of a single reduced scale SERGEANT and the 20-lb instrumented payload which is 6" in diameter and 36" long. This shroud protects the second stage against aerodynamic heating.

When the Navy was assigned responsibility for the VANGUARD development, this satellite project was terminated. However, when the JUPITER program was initiated shortly thereafter, the work already done on this vehicle was reoriented to provide a re-entry test vehicle for the development of a heat-protected nose cone for the JUPITER. Three missiles were produced in this configuration to test the propulsion system and the activation of the second and third stages of this re-entry test vehicle. The active fourth stage was replaced by an inert motor and the payload was modified to carry flight instrumentation only. The first of these missiles was fired on 20 September 1956. It was an outstanding success, reaching an altitude of 682 miles, a range of 3,355 miles and a maximum speed of 12,200 miles per hour. This firing was so successful that the other two missiles were not needed. They are currently available and with an active fourth stage can be modified to orbit a satellite within three months. Nine other JUPITER-C's were produced to conduct the

remainder of the re-entry testing. The second of these fired 8 August 1957 delivered a scale model of the JUPITER heat-protected nose cone to a range of approximately 1150 n.m. The nose cone was successfully recovered. As a result, no further JUPITER-C re-entry firings are required.

The propulsion and performance of the three most difficult stages required for satellite firings have been fully proven by the three JUPITER-C missiles. The remaining missiles thus represent the most advanced and reliable U. S. missiles capable of establishing a satellite in orbit. On 8 November 1957, the Army was instructed to prepare two of them for launching satellites to carry scientific instrumentation in furtherance of the scientific objectives of the International Geophysical Year.

By June of next year, a 100-lb satellite capability can be attained with the configuration shown in the center of the chart. It also has four stages, the upper three stages being the same cluster of scaled SERGEANT rocket motors used with the JUPITER-C. However, a JUPITER thrust unit has replaced the elongated REDSTONE booster as the first stage. It should again be noted that only "on the shelf" missile hardware is employed. This same configuration is capable of orbiting a 15 - 20 lb. payload around the Moon.

A 500-lb satellite capability can be reached by January 1959. The launching vehicle shown on the right again represents a combination of proven components. The JUPITER 1st stage will be equipped with a 3-stage cluster of improved higher-performance solid propellant rockets of the Grand Central 33KS2300 type. The rocket motor used in this configuration is again one that has been fully proven. 65 of these engines have been fired with 100% reliability. The structural configuration of the upper three stages is exactly the same as that repeatedly proven in the JUPITER-C missile. This configuration will also provide a launching capability for a 120-lb moon rocket.

CHART 2 - Launch Schedule

This chart shows the Army's launching capability as evolved after careful study of the resources available to the Army Ballistic Missile Agency and the Jet Propulsion Laboratory. It will provide timely results with maximum assurance of success.

As shown, 20-pound satellites can be launched beginning in January — the first 100-lb satellite can be launched in June of next year, and the first 500-lb satellite in January 1959. Although this chart only covers 1958 and 1959, the program can and should continue as long as worthwhile development objectives remain to be achieved. A launching capability of one missile per month will be reached by May 1959 and can be continued indefinitely thereafter. The 20 and 100-lb satellites can be used to obtain data and conduct flight environmental tests early in the program, on which development of operational payloads of the 500-lb category can

be based. The 500-lb satellites will then become the true "work horses" of the satellite program.

CHART 2 OFF

After establishing a realistic, maximum assurance, launching capability, we must examine the multitude of possible satellite payloads compatible with the payload weight capabilities of the launching vehicles in order to lay out an integrated program which would exploit the launching capability to maximum advantage. The satellite launching capabilities shown on the last chart provide a potential means for greatly expanding our reservoir of scientific knowledge. Even more important, however, is the contribution they can make toward strengthening the national security of the United States.

Today, when the tremendous destructive effects of thermonuclear weapons, and the speed and range of intercontinental ballistic missiles make a surprise attack against the United States entirely feasible, a timely and accurate means of gathering intelligence information from within the Soviet Union is essential to our National security. Recognition of this fact was implicit in the President's "Open Skies" inspection plan. A satellite carrying surveillance equipment can collect timely and accurate intelligence information needed. It will provide a means not subject to Soviet veto of implementing the security aspects of the President's "Open Skies" plan. At the same time, such a system will be able to provide timely and accurate target information and meteorological data over the vastly expanded area from which intelligence information must be available in any future war. It will greatly improve the Army's capability to discharge its world-wide responsibilities for mapping and geodesy, and world-wide communication. Such a satellite will also assist the Army in the research and development testing and training in the operation of counter ICBM radars and tracking and acquisition equipment.

We have therefore proposed that the primary immediate objective of the satellite program be the gathering of intelligence information. On 26 October 1957, the Army submitted a proposal to the Department of Defense for a Military Reconnaissance Satellite capable of providing complete pictorial coverage of the USSR every three days, cloud cover permitting. That proposal covered a deliberate development program designed to satisfy the long-term requirement. The limiting factor, timewise, in this proposal was the development of a data processing system to handle and evaluate the mass of information supplied by such a reconnaissance satellite.

On the other hand, the most immediate and urgent national requirement is for current intelligence of selected critical areas of the Soviet Union, such as ICBM launching sites, air defense complexes, ships at sea, etc. We therefore propose to concentrate initially on meeting this more limited requirement for current intelligence - an objective which can be reached on a time scale compatible with the launching capabilities already outlined.

Some file data change

The proposed system will place a 500-pound photo-intelligence satellite in a circular orbit at an altitude of 300 miles. This satellite will provide photographic coverage of any desired area of the world. For example, it will provide documented pictorial information on any selected critical area of the Soviet Union at least once every three days, cloud cover permitting, beginning in May 1959. Pictures of critical areas in central and northern USSR can be obtained every day.

CHART 3 - Satellite Photo

This photograph of Hill Air Force Base, Provo, Utah, illustrates the quality of the pictures which will be taken by the satellite. It was produced by degrading an air photo mechanically and passing it through the type television equipment used in the satellite to simulate all known effects in taking such a picture from an orbiting satellite. To give you an idea of the scale, the main runway is approximately 10,000 feet long. With such pictures it is possible to distinguish objects approximately 100 feet apart and to locate missile launching sites, airports, ships, factories, and other targets of military importance.

Early data on pictorial quality and transmission from a satellite will be obtained during the 100-pound phase. This payload will be equipped with 1/2 inch vidicon tubes to take a series of pictures and the necessary electronic equipment to transmit them immediately to the ground.

Ability to launch 500-pound satellites will permit us to move rapidly toward the attainment of an operational capability.

CHART 4 - 500 POUND Satellite

This chart shows a satellite of the 500-pound weight class, equipped with the necessary optical electronic, and control equipment for gathering, storing, and transmitting pictorial intelligence data from actual or potential enemy territory. The pictorial data will be transmitted on command to ground stations in the United States where it will be recorded and processed. For most areas of the USSR, photo prints can be made available for intelligence processing approximately 30 minutes after the pictures are taken.

In order to insure the best possible lighting conditions for photography, the satellite will be launched southward into an orbit which has an 83 degree inclination from the equator, in other words tipped 7 degrees away from the poles. The use of this orbit insures that the satellite will always pass over the illuminated part of the earth with the sun directly overhead. This orbit also insures that the satellite passes within surveillance range of any area of the earth's surface once every three days (except for a small circle around each pole).

In order to insure the best possible accuracy for mapping and target location, it is desirable that the satellite be launched from a point the proper distance north of the equator to permit it to be approximately over

the equator at burnout of the final stage. In this way the [illegible] axis of the satellite will be approximately parallel to the axis of the earth. Such a possible launching site is the Panama Canal Zone. Although the research and development firings and the initial system demonstration firings will be conducted from the Florida Missile Test Range, the proposed program visualizes that the operational firings will take place from a site located in the Canal Zone.

The picture-taking sequence will be initiated and terminated by an on-board programmer-timer which will have been set for a desired target area by coded command from the ground during the previous pass of the satellite over a ground station in the United States. For security purposes the timer will incorporate limit stops which will prevent photographing of United States territory.

During the time pictures are being taken, the lens system will focus an image of a 10 x 1 mile area of the earth's surface on a recording and storage device which will employ television recording techniques. Early operational models of the payload will incorporate a new miniature vidicon television tube and a magnetic tape recorder which will allow pictorial coverage of up to 45,000 sq. miles per orbit. In later models, the image will be projected directly onto an electro-static storage tape which will act as a combination camera and storage medium. The electro-static tape will provide a greater storage capability. The satellite will rotate at about 30 revolutions per minute around its spin axis so that the optical system will sweep over the earth's surface once every two seconds. During each rotation of the satellite, pictures will be taken of a swath 10 miles long and up to 100 miles wide, depending on the setting of the programmer-timer. With the next spin rotation about its axis, the satellite will have advanced about 9 miles and the next swath will overlap the preceding one by approximately 1 mile. For ease of illustration, the chart does not show overlap and is not too scaled. Succeeding swathes will be photographed until the picture-taking sequence is terminated by the programmer-timer.

Electric power will be generated by solar cells which cover the outside surface of the 40" sphere, and will be stored in storage batteries to furnish peak power requirements. The use of solar cells makes the useful lifetime of the satellite independent of primary battery life. The useful life of the complete satellite is estimated as in excess of one year.

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Introduction of the electro-static tape into the photo-intelligence payload will provide sufficient storage density to furnish a capability for full photo reconnaissance coverage of the Soviet Union. Pictures of the entire area of the USSR can be provided every [illegible] days, cloud cover permitting. Full exploitation of this blanket coverage capability will, however, require the development of improved techniques and automatic procedures for photo interpretation and data processing. It is expected that a parallel pictorial data study and simulation program can significantly increase our data handling capability, beginning in [illegible].

The same ground stations used for the recording of selected area information can be used to receive and record the full pictorial coverage. Introduction of new data-handling techniques will provide a continuing growth of our capability to make use of the full coverage rate.

CHART 5 - Additional Capabilities

The satellite shows great promise for application to other military missions. This chart shows some of those which can be achieved within the next two years. In view of the importance of the intelligence mission we consider an electronic intercept payload to be the most important of these. Initially, this payload would monitor and record Soviet radar transmissions. The stored information, along with the time of intercept, would then be transmitted to ground stations in the United States for intelligence evaluation of the Soviet radar network. By this means it is expected that the geographical location of radars camouflaged against photographic location can be determined to an accuracy of 25 miles. Correlation with photo coverage will fix radar stations with mapping accuracy. Later payloads of this type after 1959 can be used to intercept Soviet communications and make this information available to analysts in this country.

Another application of great promise is a satellite equipped with radio relay equipment to supplement and extend our present world-wide communications net. In this manner, messages originating from the Pentagon, for example, would be transmitted to the satellite as it passes over Washington, stored and then retransmitted to the addressee as the device passes over the appropriate geographical location such as Paris, Bonn, etc. One such satellite could handle the entire radio traffic to and from Washington, D.C.

Thirdly, a satellite is an almost ideal instrument to provide much needed meteorological information. Much of the present uncertainty in weather forecasting results from the lack of information with respect to cloud coverage and the ratio between the energy absorbed by the earth from the sun and the energy reradiated from the earth to outer space. These two factors are most influential on weather trends over large areas for long periods of time. The satellite, scanning the earth in much the same manner as the photo-intelligence satellite, would provide this information which is today almost totally lacking, particularly in those geographical areas which determine long term weather trends.

All three of these applications are feasible of development during the short term period with which we are primarily concerned. I will discuss how we propose to exploit these capabilities in outlining our proposed schedule later in the briefing. Before leaving this chart, however, I would like to mention a longer range satellite capability which could be exploited in the period after 1959. This is a network of orbiters which, in addition to providing easy communication between individual satellites with a minimum chance of interception, may also provide the only means of making intelligence information obtained by one satellite immediately available. For example, as shown on the right

orbiters with high sensitivity infrared equipment could detect the launching of an ICBM and provide this information to ground stations in the United States through the satellite network in a matter of seconds.

So far, I have concentrated on solutions to the urgent military and national problem of obtaining intelligence information through the use of satellites. As I mentioned earlier, however, there is also a pressing need to provide an advance in the field of [illegible] and space flight which will enable the United States to regain its scientific and technical stature in the eyes of the world. This might be accomplished by firing the first U.S. moon rocket. Such a firing could be accomplished in June of next year by using the same JUPITER booster and JUPITER C upper stages described earlier. Because there is neither time nor necessity for development of new techniques, it is essential that such an attempt be based on the proven principles demonstrated in the JUPITER Composite re-entry test program. Following this initial flight, which would carry instrumentation for tracking and also provide a measure of the distances of nearest approach to the moon, firings of 120-pound payloads could be initiated with the improved 500-pound payload launching vehicle in January 1959.

CHART 6 - Cal Tech Launching Vehicle

This chart shows the configuration of this vehicle when used for moon rockets. The first stage will again use a JUPITER thrust unit, and a solid rocket cluster. While structurally identical to the JUPITER-C cluster, the upper three stages will consist of 11, 3, and 1 of the improved higher performance solid rockets described previously. The 120-pound payload would provide the first picture of the far side of the moon. These would permit identification of objects and moon forms between 2 and 10 miles apart. Other important information which can be obtained includes measurement of cosmic ray intensity, meteorites, and determination of the hydrogen content of inter-planetary space.

I have described in general terms the Army's capabilities in the satellite and space vehicle field during the next two years. I should like now to present the integrated schedule of 16 firings which the Army proposed to the DOD Advisory Group on Special Capabilities on 14 November 1957. This schedule has been developed to provide maximum flexibility and to permit attainment of the greatest number of capabilities in the most rapid and economical manner.

CHART 7 - Development Program

This chart shows that schedule. The chart shows the types of launching vehicles and the mission of each firing. Research and Development missiles are white and operational missiles green. The attainment of first capabilities is high-lighted by the red symbols identifying the mission. Two JUPITER-C firings of 20-pound satellites in January and March 1958 would provide the basic data on satellite launching and orbital [illegible] which are prerequisite to further development. The first moon rocket with a 15-pound payload would be fired in June 1958 using the JUPITER booster and JUPITER-C upper stages. Alternatively, this vehicle could be used to

Regrading data cannot be predetermined

establish a 100-pound payload in an earth orbit. If desired, this could carry, for psychological purposes, a high visibility device such as the 12-foot diameter inflatable structure proposed by the National Advisory Committee for Aeronautics. Or, by adding another JUPITER -C launching vehicle to this program, we could fire both the moon rocket and the high visibility device during June. The first photo-intelligence satellites would be launched in September and October 1958 to demonstrate the feasibility of obtaining pictures from a satellite orbit. In order to correlate the pictorial data with a known area of the earth's surface and to check the quality of the pictures, these first pictures would be taken over the United States. The November 1958 firing would establish in orbit the first electronic intercept payload. Alternatively, a meteorological satellite could be fired with this launching vehicle. In January 1959 the first pictures of the far side of the moon would be obtained with the 120-pound payload rocket previously described. The first 500-pound satellite carrying a complete photo-intelligence payload with magnetic storage tape will be launched in March 1959 to provide a system test. This satellite will provide the first pictures from within the Soviet Union. It will be followed in May 1959 with the first operational satellite capable of providing pictorial coverage of selected areas of the USSR. A second such payload can be launched in July 1959 if required. An operational electronic intercept, 500-pound payload can be launched in June. An alternative to the photo-intelligence satellite payload in August could be an operational meteorological satellite. The September 1959 launching will provide a system test of the electrostatic storage tape system leading to the first operational satellite with this increased capability in November 1959. The October firing would launch the third moon rocket and the second with a 120-pound payload. This launching rate of one per month beginning in May 1959 can be continued indefinitely. This capability could be exploited for example in establishing a satellite network of the type described earlier. Throughout the schedule, its flexibility will permit substitution of alternative payloads for those shown on the chart.

Although not included in this schedule at this time, it would be possible during 1959 to test the launching of a recoverable satellite. The scale model JUPITER nose cone successfully recovered after re-entry in August could, with slight modification, be used as a basis for the design of a re-entry satellite. A small braking rocket would lower the perigee of the orbit to a point where air drag would be sufficient to bring the satellite to earth. This can be done with sufficient accuracy to insure a landing within the North American continent.

The estimated cost of this 16 launching program is approximately $440 million over a three year period. These costs include those for the ground stations required for tracking and data processing of the information obtained by the photo-intelligence and other satellites. During the first fiscal year approximately $229 million will be required.

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I have mentioned a satellite network as a logical extension of our satellite capabilities after 1959. At the same time, the growth potential of the launching vehicles themselves can be exploited to give us the capability of orbiting 2,000-pound payloads by about 1961 and 4,000-pound payloads a year or two later. These payloads represent a logical exploitation of the 16 vehicle program which is intended to capitalize to the maximum on the Army's early capability to launch satellites with payloads of sufficient size for military utility and scientific research. The increased payloads are further steps in a development program whose ultimate objective must be the launching of manned satellites and the establishment in orbit of manned space platforms.

In addition to its requirements for military satellites, the United States has an equally urgent national requirement for a satellite defense system. Sooner or later, in the interest of survival, the United States will have to be able to defend itself against satellite intrusion; otherwise, it will be helpless before any aggressor equipped with armed reconnaissance satellites. Not only will it be helpless, in fact, it will be helpless in international councils, such as the United Nations, if it endeavors to make an aggressor desist from active reconnaissance or attack of our country. Only by being able to destroy a satellite in space, at our will, can we command respect in international councils dealing with the problem. A program to provide a weapon system capable of destroying a satellite in space has been under study by the Army for the past six months. At the moment, early preliminary indications from these studies point toward two possible solutions to this problem as shown on this chart.

CHART 8 - Satellite Defense Systems

One, as shown on the left, is a system which may prove to be a logical extension of the NIKE ZEUS Anti-Intercontinental Ballistic Missile system.

The second, as shown on the right, is a "homing satellite" carrying either a nuclear or shaped charge warhead. Launched into an orbit in which it would follow or precede its target by no more than 50 miles, this weapon would home on the target when the latter transmitted its information to the ground.

The Army is continuing these studies as a matter of urgency and will submit its recommendations as to how to satisfy this vital requirement at an early date.

In summary, the Army believes that a more effective means for obtaining intelligence information from within the USSR is needed by the United States and its Armed Services -- that an orbiting satellite is the most effective means for obtaining this intelligence information -- that the development of such a satellite system is fully possible with current techniques, no scientific or technological breakthroughs are required -- that the Army has the flight-tested hardware for immediate initiation of such a development. The experience gained during the firing of over 35 large ballistic missiles and the availability of proven

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hardware with almost immediate satellite capability, give the Army the ability to undertake this program without delay. This experience and hardware insure that the proposed photo-intelligence satellite system and the electronic intercept satellite can be operational within a minimum of time and offer the earliest possible capability to fire a moon rocket. Such a program will also provide satellites for other military applications and would be the first step in a [illegible] program which can lead to undreamed of advances in science and the military art.

In this manner, the Army can satisfy the Nation's and its allies' urgent requirement for accurate and timely intelligence from within the USSR in less time, for less cost, and with a greater assurance of success than any other agency.

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U.S. ARMY

SATELLITE PROGRAMS

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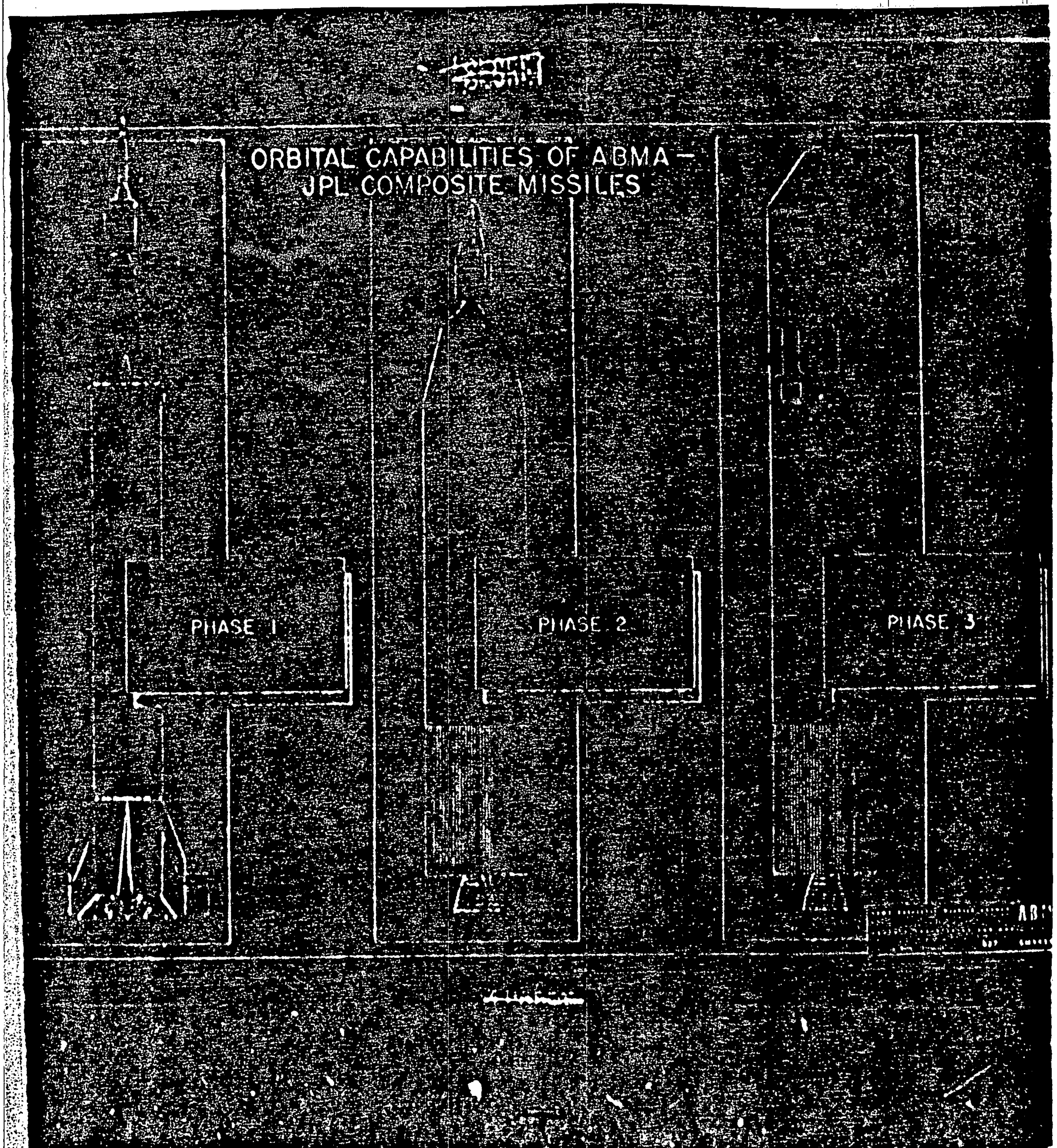
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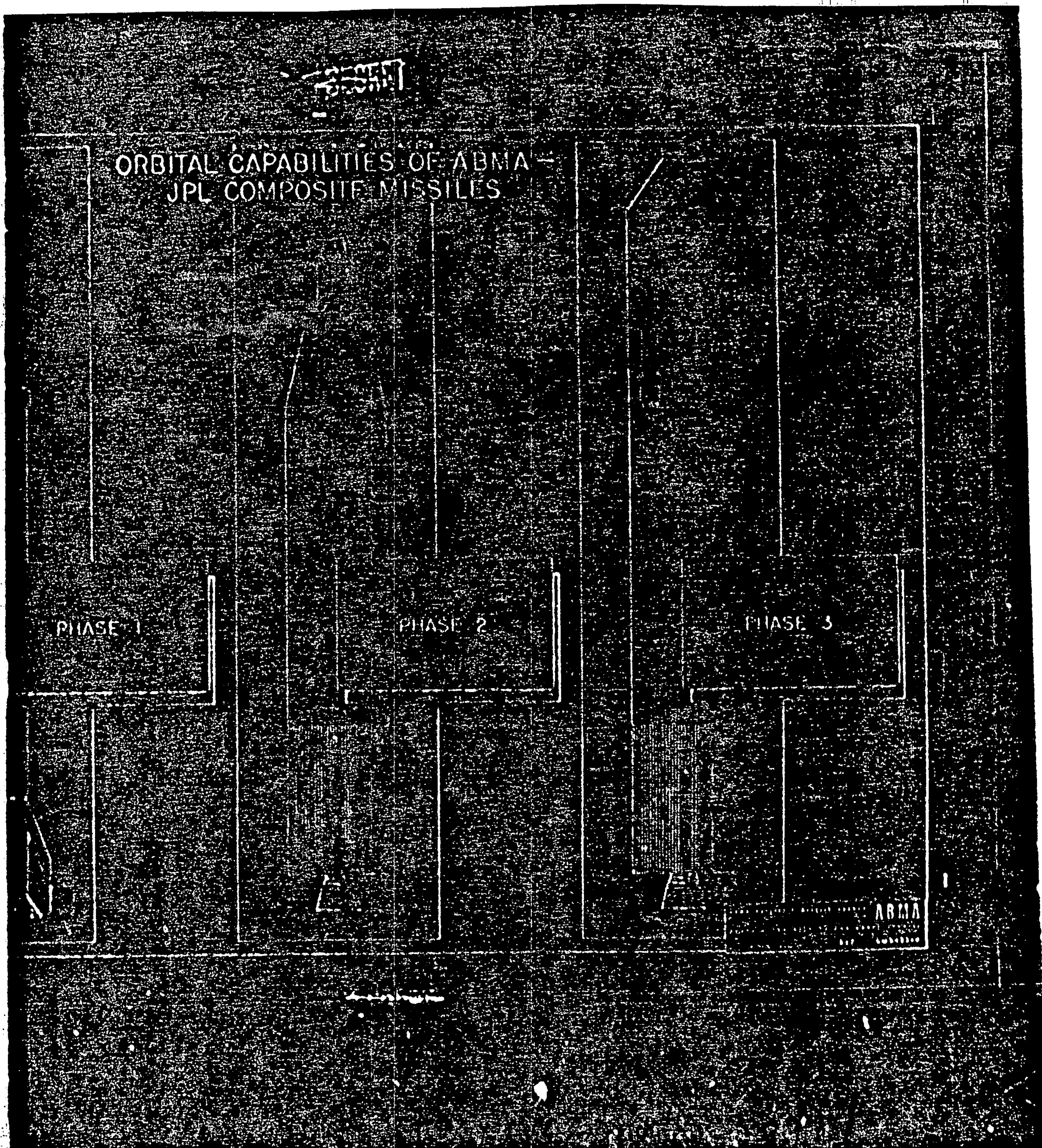
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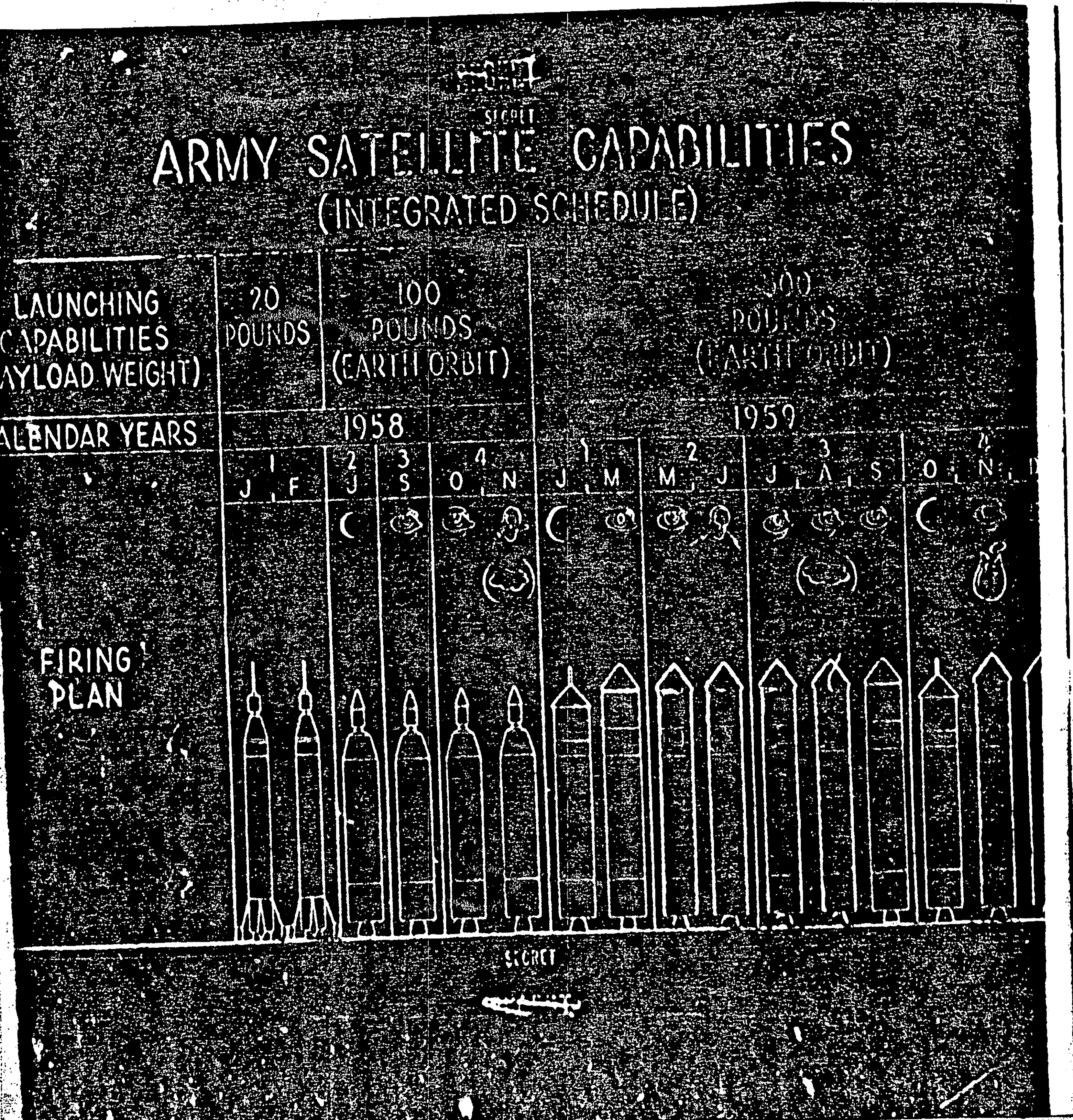

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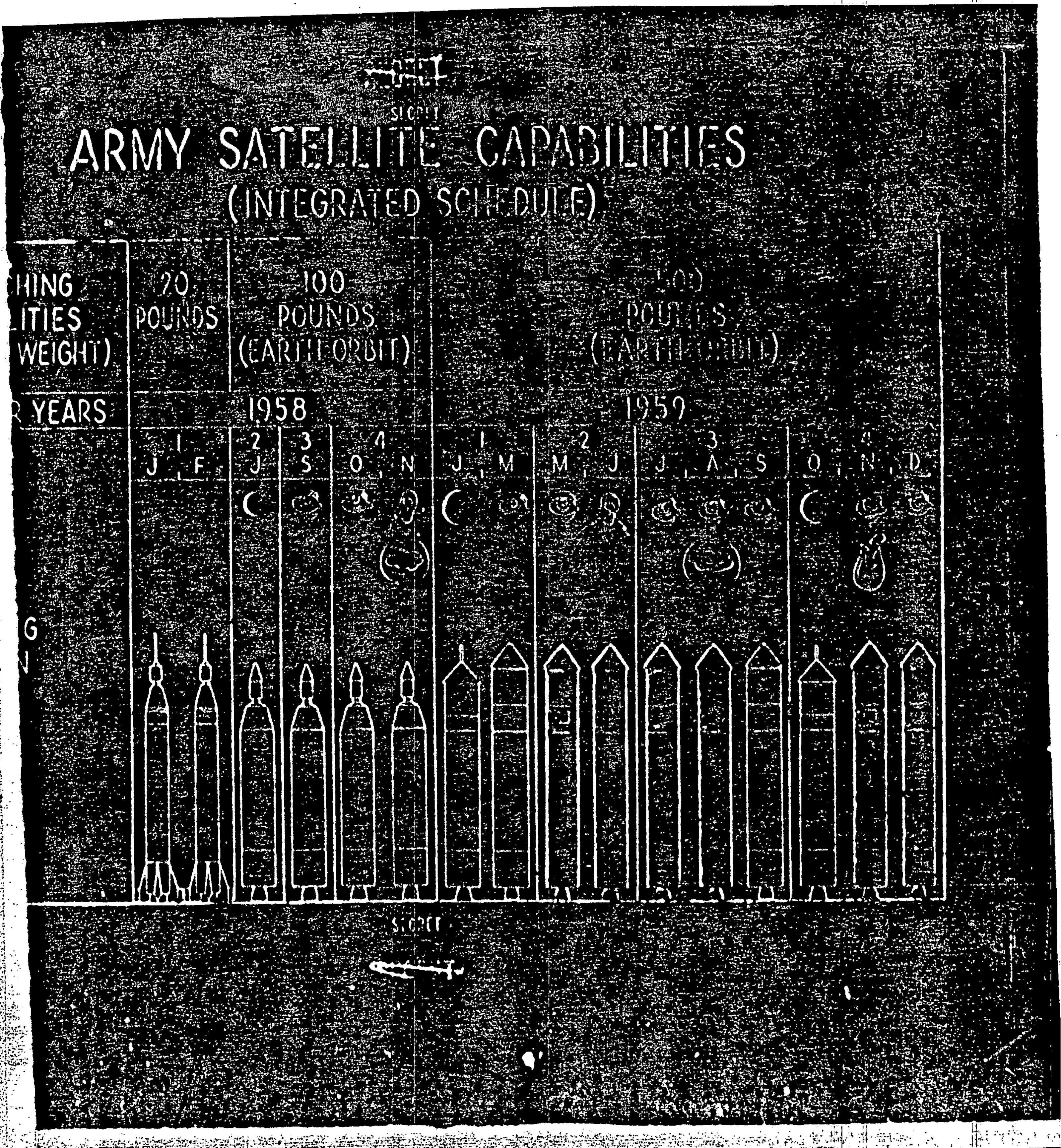

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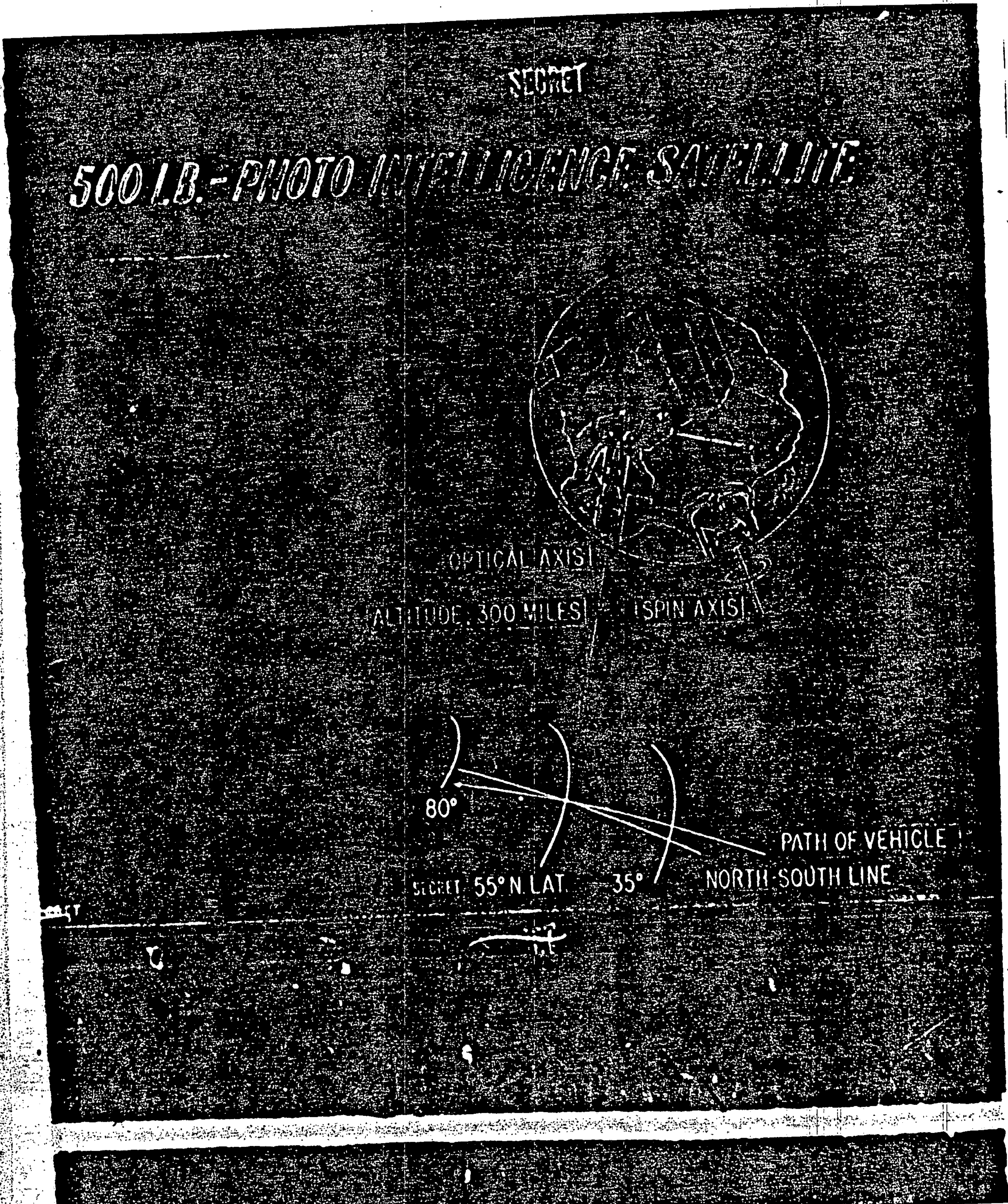

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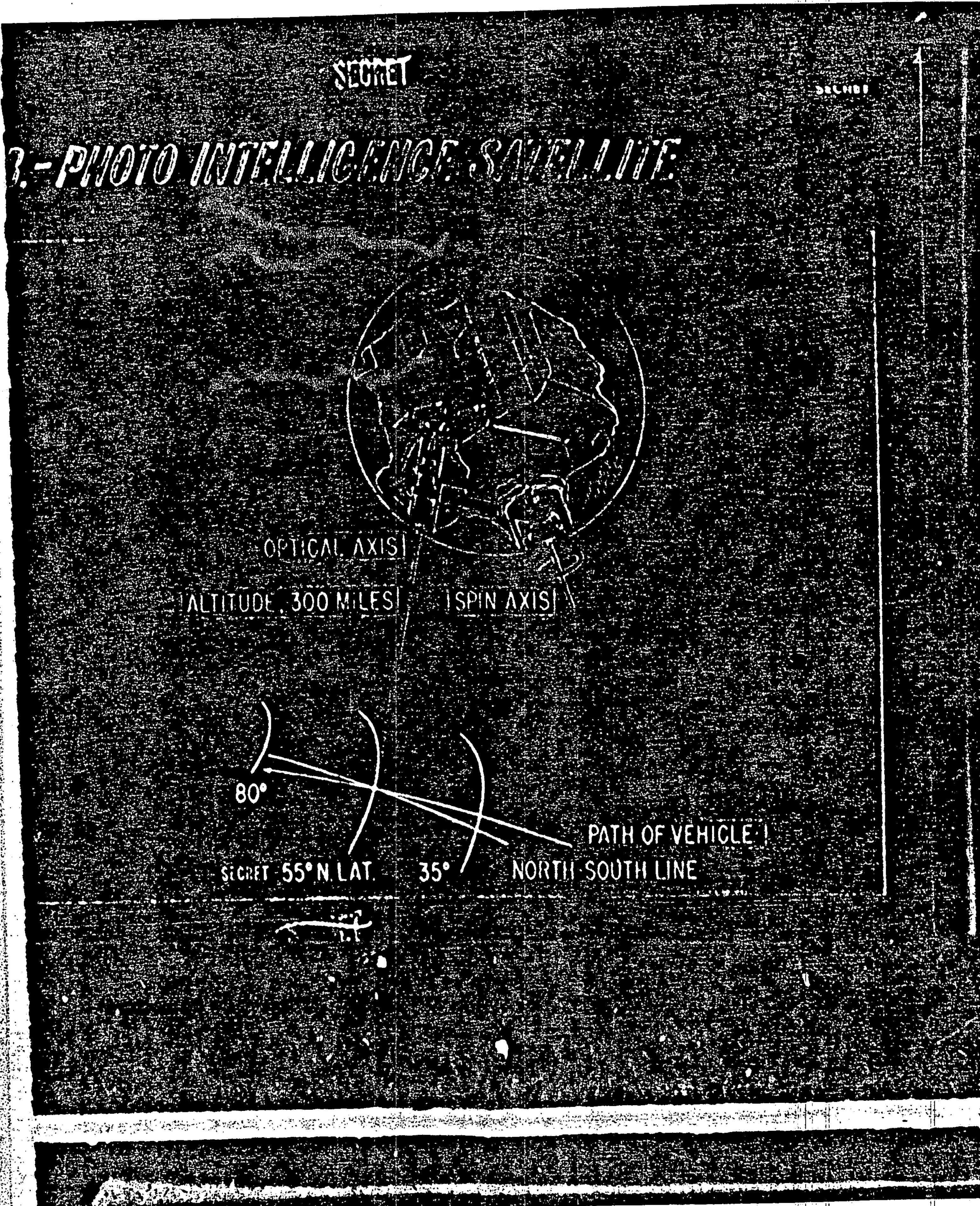
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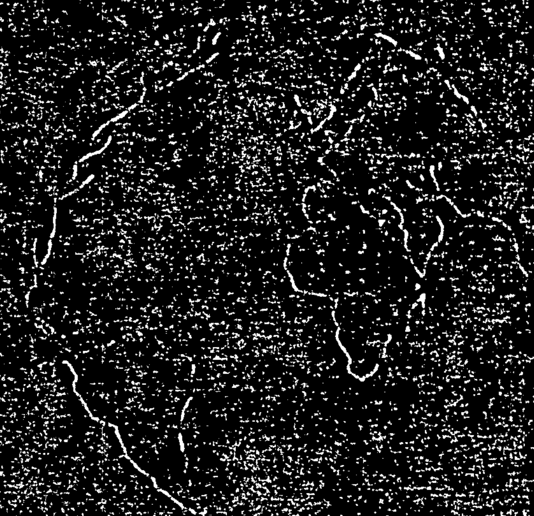

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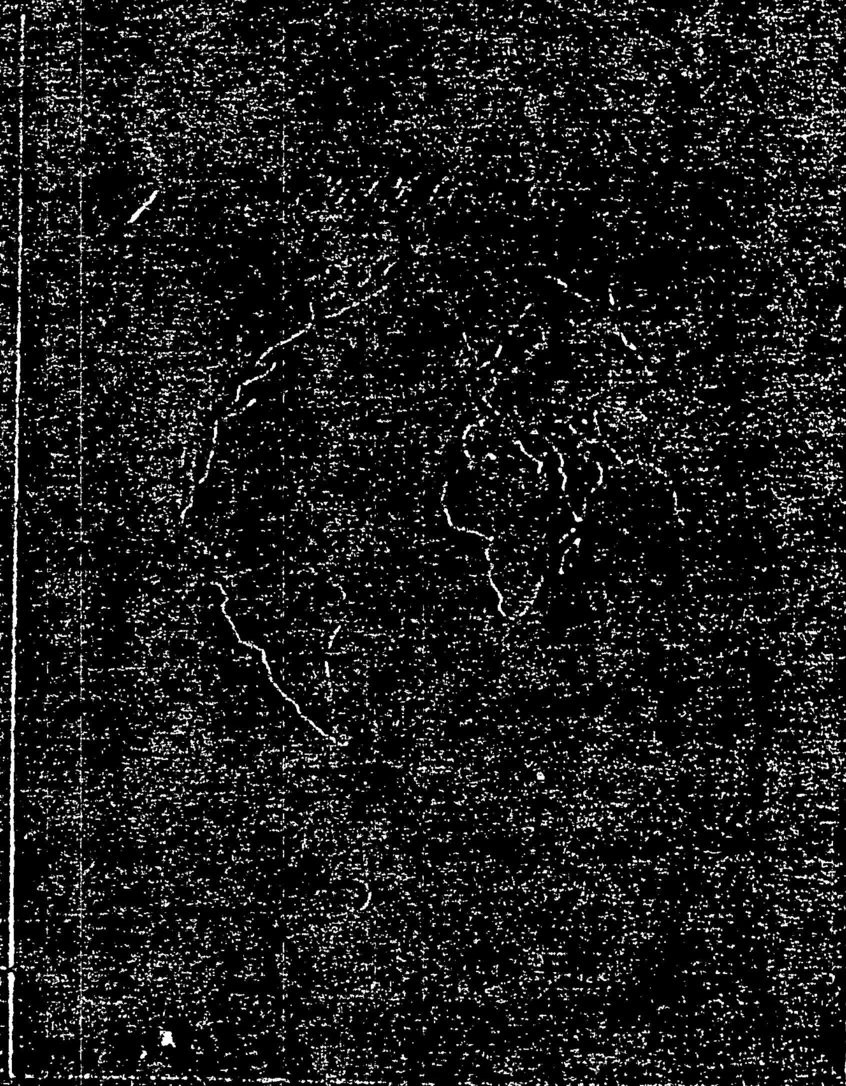

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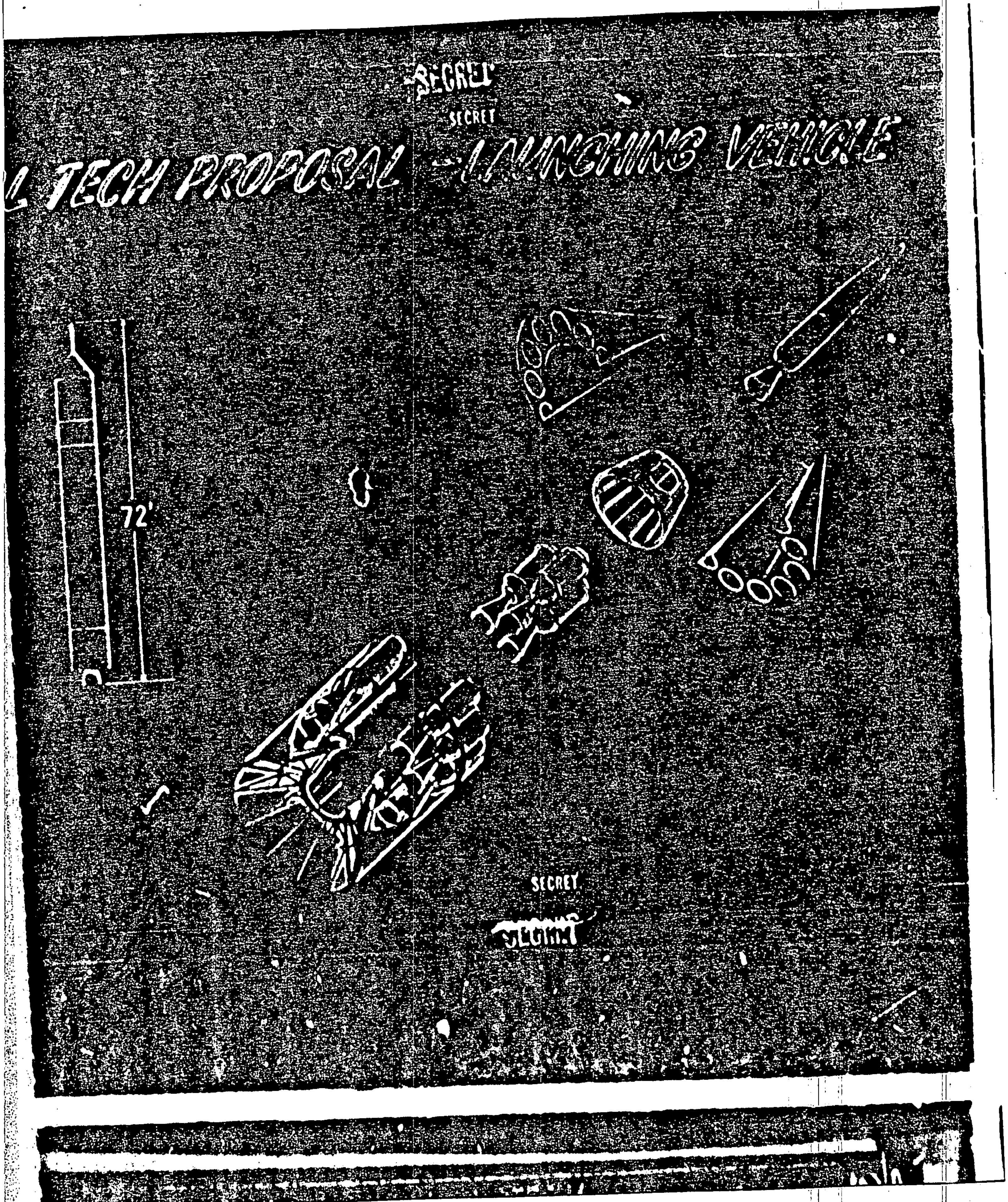
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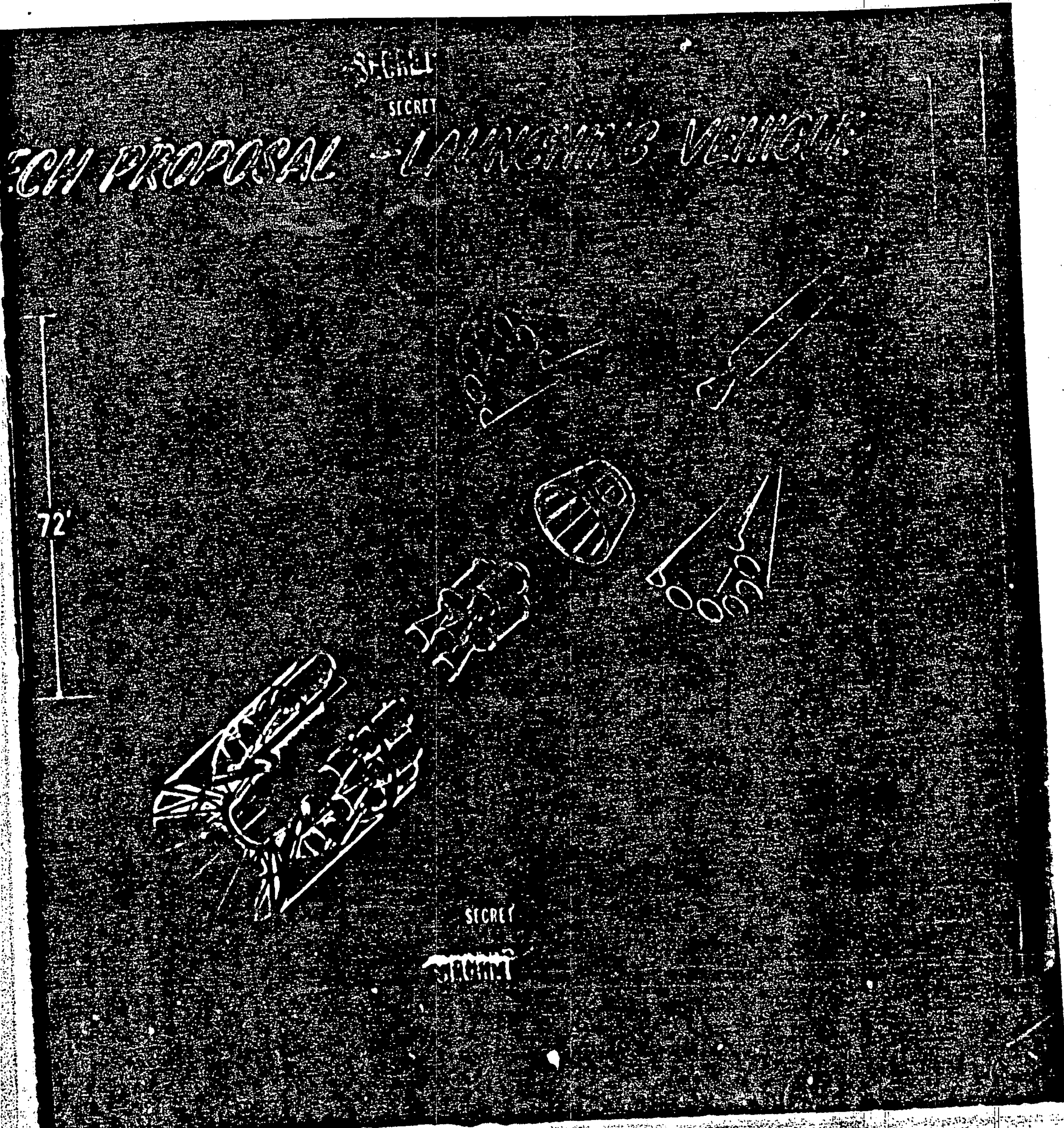
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SATELLITE DEFENSE SYSTEMS

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SATELLITE DEFENSE SYSTEMS

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